

WHAT IS CLAIMED:

1. A method of performing route lookups for a plurality of data, comprising:  
processing, by a processor, a first data to generate routing information until first information is needed;  
requesting the first information;  
storing first context state information for the first data;  
processing, by the processor, a second data to generate routing information until second information is needed;  
requesting the second information;  
storing second context state information for the second data; and  
resuming processing, by the processor, on the first data using the stored first context state information after the requested first information is received.
2. The method of claim 1, further comprising:  
receiving the requested first information from memory.
3. The method of claim 2, wherein said processing of a second data is performed before said receiving the requested first information.
4. The method of claim 2, further comprising:  
processing, by the processor, a third data to generate routing information until third information is needed, and

processing, by the processor, a fourth data to generate routing information until fourth information is needed,

wherein at least one of said processing of a third data and said processing a fourth data is performed before said receiving the requested first information.

5. The method of claim 1, further comprising:

determining which data to process next when information is needed.

6. A method of processing for routing packets, comprising:

processing a first data related to routing of a first packet until first information is needed;

requesting the first information;

storing intermediate information related to the first data; and

processing a second data related to routing of a second packet while waiting for the requested first information to arrive.

7. The method of claim 6, further comprising:

processing the first data based on the stored intermediate information and the first information.

8. The method of claim 6, further comprising:

determining which of the plurality of data to process next when information is needed.

9. A method for routing packets of information using corresponding data structures, comprising:

- receiving a plurality of data structures related to the packets of information;
- sending the data structures to a plurality of processing engines, data structure corresponding to a different packet of information;
- performing, at each processing engine, concurrent route lookups for at least two of the data structures at a time; and
- modifying the data structures based on the route lookups; and
- routing the packets of information based on the modified data structure.

10. The method of claim 9, further comprising:

- forwarding the modified data structures.

11. The method of claim 9, further comprising:

- conducting accounting, filtering, or policing functions on the data structures during said performing step.

12. The method of claim 9, wherein said performing includes:

- performing, at each processing engine, concurrent route lookups for four different data structures.

13. A network device comprising:

an input portion configured to receive data structures and to transmit data items associated with the data structures;

a plurality of processing engines, each processing engine being configured to receive a plurality of data items from the input portion and to contemporaneously compute routes for the plurality of data items;

a resource configured to receive requests from the plurality of processing engines; and

a result processor configured to modify the data structures based on the routes computed by the plurality of processing engines.

14. The network device of claim 13, wherein each of the plurality of processing engines includes multiple context-switched engines.

15. The network device of claim 13, wherein the memory includes random access memory.

16. The network device of claim 13, wherein each of the plurality of processing engines includes:

a data processor configured to calculate a route for one key at a time,

a functional control state machine configured to control operation of the data processor, and

a context buffer configured to store a partially calculated route from the data processor and a processing state from the functional control state machine.

17. The network device of claim 13, wherein each of the plurality of processing engines further includes:

a context switch controller configured to cause the data processor and the functional control state machine to respectively store the partially calculated route and the processing state in the context buffer when the data processor requests data from the memory.

18. The network device of claim 13, wherein each of the plurality of processing engines further includes:

an output buffer configured to store a fully calculated route for output to the result processor.

19. A system for performing route lookups for processing a plurality of data items, comprising:

a data processing portion configured to process one data item at a time and to request data when needed;

a buffer configured to store a partial result from the data processing portion; and

a controller configured to load the partial result from the data processing portion into the buffer and to input another data item into the data processing portion for processing while requested data is obtained for a prior data item.

20. The system of claim 19, further comprising:

an output buffer configured to store a completely processed data item from the data processing portion.

21. The system of claim 19, further comprising:

an input buffer configured to store a plurality of data items to be processed by the data processing portion.

22. The system of claim 19, wherein the data processing portion includes:

a data processor configured to determine a route associated with a data item, and  
a state machine configured to interact with the data processor and to inform the controller when the data processor will request data from the memory.

23. A system, comprising:

means for processing data structures to generate routing information and for requesting information;

means for storing intermediate products from the means for processing while waiting for requested information; and

means for loading the intermediate products into the means for storing and loading a data structure into the means for processing when the means for processing requests the information, and for loading the intermediate products into the means for processing after the requested information arrives.